**MATH FOR MANUFACTURING SYLLABUS (Semester I)**

**Course Description**: The “Math for MFG” semester I curriculum provides progressive building block modules (32 Units of Study) that provide the foundation mathematic tools required to become proficient in all areas of Advanced Manufacturing skill training. Major topics covered include the following;

* **Numerical Systems & Symbols**: Numbers describe a discrete single value (e.g whole number, fraction, decimal, negative, imaginary, rational…), how that number is expressed (e.g. basis of scale ln/log, base 10, Exponential…) and meaningful scaling unit symbols (e.g. %, $, lbs…).
* **Types & Order of Math Operations**: The basic operations of handling combinations of addition, subtraction, multiplication and division (also powers, exponents, roots…) have a hierarchy according to commutative, associative and distributive laws.
* **Forming & Solving Equations**: In math operations, forming an equation correctly to solve a practical problem (e.g.; 2x3 +6 = 12 vs 2x(3+6) = 18) is critical in applications.
* **Conversion of Numbers**: Numbers can be expressed in various forms (whole number, fraction, decimal, percentage…) which require conversion between mixed forms to a single representation (e.g. 6.25, 6-1/4, .0625%).
* **Advanced Operations**: Numbers can have additional operations (e.g. powers, exponents, roots, ln/log…) to compute associated values.
* **Charting & Graphing**: Visual representation of numerical data and equations is powerful in understanding the relationship between sets of numbers usually done in 1, 2 or 3 coordinate dimensions of graphing. It is valuable in the subsequent study of algebra, trigonometry, geometry and sets of equations.
* **Units of Measurement**: The science of measurement (metrology) requires quantifying a selected measurement quantity (e.g. length, width, mass, density, area…) with the correct unit of measure in scaling.
* **Understanding Variables**: Fundamental Algebra describes the relationship between a group of numbers defined as independent variables (X) to dependent variables (Y) through a characteristic equation (e.g. Y=3\*X +7). It also can involve more than 2 variables referred to as Systems of Equations.
* **Trigonometry**: Combining Lines and Angles in various closed 3 sided shapes referred to as triangulation provides a valuable tool to define distance, magnitude/direction and other valuable quantities. The principle of trigonometry is based on the Pythagorean law and associated identities. It is used in 2 dimensional as well as 3 dimensional space.
* **Geometry**: Closed form shapes can be defined in 2 Dimensions (planar geometry) or 3 dimensions (3D Solid Geometry). These shapes have defined topology (surface characteristics) features (e.g. triangles circles, squares, rectangles, polygons, cubes, spheres, tetrahedrons…) defined by mathematic equations (e.g. linear size, area, volume, surface…).
* **Introductory Statistics**: Sets of numbers describing a defined group (e.g. average height of classroom students, average savings of a family, variation of a crankshaft manufacturer…) have trends in the data in what is referred to as the mean (average) and range of the data (variation). Statistics models data and predicts trends to understand the concept of variation and central tendency within a population group. It is a valuable tool in advanced manufacturing quality

**Course Schedule**: The 16 week course covers 2 units per week and two topics per unit. Successive 90 minute units are taught on Mondays at 9:45AM (MT) and Wednesdays at 8:00AM (MT). Students may enroll for the entire course or enroll for any specific unit or units. Please reference the overall program course schedule for complete scheduling information.

**Instructors**: lecturers delivering course training include; Dr. Christopher Griffen ( christophertgriffen@gmail.com, Ph: 906-298-1642); Karl Haefner (karl.haefner@littlehoop.edu, 872-600-5985); Kathyrn Hall (kathrynhall@tm.edu 701-550-0308 and Dr. Ragavanantham Shanmugam (rags@navajotech.edu 505-409-0663). Office hrs are 5-7PM (MT) Mon-Fri.

**Course Media**: Lectures will be through a virtual online live classroom format with all content and references supplied.

**Contact Info**: *Please feel free to call or email Dr. Christopher Griffen regarding questions or further detail*